	COMPOSI	TION- BIO	RETENTION SO	OIL MIX (BS	<b>M</b> )	
TEST PROPERTY	TEST <sup>1</sup> METHOD	TEST VALUE				
Weeds	_	Free of seed and viable plant parts of species in 920.06.02(a)(b)(c) whe inspected.				
Debris	_	No observable content of cement, concrete, asphalt, crushed gravel or construction debris.				
Hardwood Mulch	_	20% of the loose volume of BSM when inspected.				
	T-XX	Particle		% Passing by Weight		
		Size	mm	Minimum	Ma	ximum
Textural		Sand	2.0 - 0.050	79	94	
Analysis		Silt	0.050 - 0.002	4	20	Combined
		Clay	less than 0.002	1	10	Silt and Clay 21
Soil pH	ASTM D 4972	pH of 5.7 to 7.4.				
Organic Matter	T-267	Minimum 1.5 % by weight.				
Soluble Salts	EC 1:2 (V:V)	500 ppm (0.78 mmhos/cm) or less.				
Harmful Materials	_	920.01.01(a).				

Test methods not defined herein shall be as per visual inspection or methods defined by the Landscape Operations Division.

Materials Standards and Materials Testing 356 (MSMT 356) has been superseded by OMT Landscaping Soils Eligibility List.

### PERMEABLE PAVEMENT INSTALLATION

Stabilize Drainage Area-Construction of the permeable pavement should only begin after the entire contributing drainage area has been stabilized. The proposed site should be checked for existing utilities prior to any excavation. Do not install the system in rain or snow and do not install frozen bedding materials.

Install Soil Erosion and Sediment Control Measures- As noted above, temporary soil erosion and sediment controls are needed during installation to divert stormwater away from the permeable pavement area until it is completed. Special protection measures, such as erosion control fabrics, may be needed to protect vulnerable side slopes from erosion during the excavation process. The proposed permeable pavement area must be kept free from sediment during the entire construction process. Construction materials contaminated by sediment must be removed and replaced with clean material.

Minimize Impact of Heavy Installation Equipment- Where possible, excavators or backhoes should work from the sides to excavate the reservoir layer to its appropriate design Excavating equipment should have arms with adequate extension so they do not have to work inside the footprint of the permeable pavement area (to avoid compaction). Contractors can utilize a cell construction approach, whereby the proposed permeable pavement area is split into 500- to 1,000-square foot temporary cells with a 10- to 15-foot wide earth bridge in between, so cells can be excavated from the side. Excavated material should be placed away from the open excavation so as to not jeopardize the stability of the side walls.

Promote Infiltration Rate- The native soils along the bottom of the permeable pavement system should be scarified or tilled to a depth of 3 to 4 inches prior to the placement of the filter layer

Order of Materials- Geotextile fabric should be installed on the sides of the reservoir layer. Geotextile fabric strips should overlap down-slope by a minimum of 2 feet and be secured a minimum of 4 feet beyond the edge of the excavation. Excess geotextile fabric should not be trimmed until the site is fully stabilized.

Stone Reservoir Media- Spread 6-inch lifts of the appropriate clean, double washed stone aggregate (No. 57 stone). Compact it using a vibratory roller in static mode until there is no visible movement of the aggregate. Do not crush the aggregate with the roller.

Bedding Media- Install the desired depth of the bedding layer (4 inches).

## Install porous asphalt pavement similarly to regular asphalt pavement. The pavement should be laid in a single lift over the filter course. The laying temperature should be between 230°F and 260°F, with a minimum air temperature of 50°F, to ensure the surface does not stiffen before compaction.

Complete compaction of the surface course when the surface is cool enough to resist a 10-ton roller. One or two passes of the roller are required for proper compaction. More rolling could cause a reduction in the porosity of the pavement.

The mixing plant must provide certification of the aggregate mix, abrasion loss factor, and asphalt content in the mix. Test the asphalt mix for its resistance to stripping by water using ASTM 1664. If the estimated coating area is not above 95 percent, additional anti-stripping agents must be added to the mix.

Transport the mix to the site in a clean vehicle with smooth dump beds sprayed with a non-petroleum release agent. The mix shall be covered during transportation to control cooling.

Test the full permeability of the pavement surface by application of clean water at a rate of at least five gallons per minute over the entire surface. All water must infiltrate directly, without puddle formation or surface runoff.

Inspect the facility 18 to 30 hours after a significant rainfall (greater than 1/2 inch) or artificial flooding to determine if the facility is draining properly.

Frequency	Maintenance Tasks
After installation	For the first 6 months following construction, the practice and CDA should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.
Once every 1–2 months during the growing season	Mow grass in grid paver applications
As needed	Stabilize the CDA to prevent erosion  Remove any soil or sediment deposited on pavement.  Replace or repair any pavement surfaces that are degenerating or spalling
2–4 times per year (depending on use)	Mechanically sweep pavement with a standard street sweeper to prevent clogging
Annually	Conduct a maintenance inspection Spot weed for grass applications
Once every 2–3 years	Remove any accumulated sediment in pretreatment cells and inflow points
If clogged	Conduct maintenance using a regenerative street sweeper or a vacuum sweeper Replace any necessary joint material

## PERMEABLE PAVEMENT MATERIALS SPECIFICATION

### Bedding Layer: 4 inches of No. 57 stone

ASTM D448 size No. 8 stone (e.g., 3/8 to 3/16 inch in size). Must be double-washed and clean and free of all fines.

### Reservoir Layer 12 inches of No. 57 stone

ASTM D448 size No. 57 stone (e.g., 1 1/2 to 1/2-

inch in size); Must be double-washed and clean and free of all fines.

Use a perforated 4-to 6-Inch vertical PVC pipe (AASHTO M 252) with a lockable cap, installed flush with

### The following asphalt mix designs are recommended: PG 64-28 with 5 pounds of fibers per ton of asphalt mix.

noted otherwise below or approved in writing by the Engineer.

1. Mix materials Mix materials consist of modified performance grade asphalt binder (PGAB), coarse and fine aggregates, and optional additives such as silicone, fibers, mineral fillers, fatty amines, and hydrated lime. Materials shall meet the requirements of the NAPA's Design, Construction, and Maintenance of Open-Graded Friction Courses, Information Series 115 (2002), except where

2. Polymer Modified PGAB and Mix Designs. The asphalt binder shall be a polymer and/or fiber modified Performance Graded asphalt binder (PGAB) used in the production of Superpave Hot Mix Asphalt (HMA) mixtures. Ideally for maximum durability, the PGAB shall be two grades stiffer than that required for dense mix asphalt (DMA) parking lot installations, which is often achieved by adding a polymer and/or fiber. Mix designs will meet or exceed criteria listed in Table 5 The PGAB polymer modifiers are to be either styrene butadiene rubber (SBR). The quantity of rubber solids in the SBR shall typically be 1.5-3% by weight of the bitumen content of the mix. The dosage of fiber additives shall be either 0.3 percent cellulose fibers or 0.4 percent mineral fibers by total mixture mass. The binder shall meet the requirements of AASHTO M320. The PGAB may be pre-blended or post-blended. The pre-blended binder can be pre-blended at the source or at a terminal. For post-blended addition, the modifier can either be in-line blended or injected into the pugmill at the plant.

3. Anti-Stripping Mix Additives. The mix shall be tested for moisture susceptibility and asphalt stripping from the aggregate by AASHTO T283. If the retained tensile strength (TSR) < 80% upon testing, a heat stable additive shall be furnished to improve the anti-stripping properties of the asphalt binder. Test with one freeze-thaw cycle (rather than five recommended in NAPA IS 115). The amount and type of additive (e.g. fatty amines or hydrated lime) to be used shall be based on the manufacturer's recommendations, the mix design test results, and shall be approved by the Engineer. Silicone shall be added to the binder at the rate of 1.5 mL/m3 (1 oz. per 5000 gal). Fibers may be added per manufacturer and NAPA IS 115 recommendation if the draindown requirement cannot be met (<0.3% via ASTM D6390) provided that the air void content requirement is met (>18%, or >16% as tested with CoreLok device). Additives should be added per the relevant DOT specification and NAPA IS 115.

4. Coarse Aggregate. Coarse aggregate shall be that part of the aggregate retained on the No. 8 sieve; it shall consist of clean, tough, durable fragments of crushed stone, or crushed gravel of uniform quality throughout. Coarse aggregate shall be crushed stone or crushed gravel and shall have a percentage of wear as determined by AASHTO T96 of not more than 40 percent. In the mixture, at least 75 percent, by mass (weight), of the material coarser than the 4.75 mm (No. 4) sieve shall have at least two fractured faces, and 90 percent shall have one or more fractured faces (ASTM D5821). Coarse aggregate shall be free from clay balls, organic matter, deleterious substances, and a not more than 8.0% of flat or elongated pieces (>3:1) as specified in ASTM

5. Fine Aggregate. The fine aggregate shall be that part of the aggregate mixture passing the No. 8 sieve and shall consist of sand, screenings, or combination thereof with uniform quality throughout. Fine aggregate shall consist of durable particles, free from injurious foreign matter. Screenings shall be of the same or similar materials as specified for coarse aggregate. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6 when tested in accordance with AASHTO T90. Fine aggregate from the total mixture shall meet plasticity requirements.

6. Porous Asphalt Mix Design Criteria. The Contractor shall submit a mix design at least 10 working days prior to the beginning of production. The Contractor shall make available samples of coarse aggregate, fine aggregate, mineral filler, fibers and a sample of the PGAB that will be used in the design of the mixture. A certificate of analysis (COA) of the PGAB will be submitted with the mix design. The COA will be certified by a laboratory meeting the requirements of AASHTO R18. The Laboratory will be certified by the state DOT, regional equivalent (e.g. NETTCP), and/or qualified under ASTM D3666. Technicians will be certified by the regional certification agency (e.g. NETTCP) in the discipline of HMA Plant Technician. Bulk specific gravity (SG) used in air void content calculations shall not be determined and results will not be accepted using AASHTO T166 (saturated surface dry), since it is not intended for open graded specimens (>10% AV). Bulk SG shall be calculated using AASHTO T275 (paraffin wax) or ASTM D6752 (automatic vacuum sealing, e.g. CoreLok). Air void content shall be calculated from the bulk SG and maximum theoretical SG (AASHTO T209) using ASTM D3203.

Table 5:	<b>Porous</b>	Asphalt I	Mix	Design	Criteria.

Sieve Size (inch/mm)	Percent Passing (%)
0.75/19	100
0.50/12.5	85-100
0.375/9.5	55-75
No.4/4.75	10-25
No.8/2.36	5-10
No.200/0.075 (#200)	2-4
Binder Content (AASHTO T164)	6 - 6.5%
Fiber Content by Total Mixture Mass	0.3% cellulose or
	0.4% mineral
Rubber Solids (SBR) Content by Weight of the	1.5-3% or TBD
Bitumen	
Air Void Content	16.0-22.0%
(ASTM D6752/AASHTO T275)	
Draindown (ASTM D6390)*	<u>&lt;</u> 0.3 %
Retained Tensile Strength (AASHTO 283)**	≥ 80 %
Cantabro abrasion test on unaged samples	≤ 20%
(ASTM D7064-04)	
Cantabro abrasion test on 7 day aged samples	≤ 30%

\*Cellulose or mineral fibers may be used to reduce draindown. \*\*If the TSR (retained tensile strength) values fall below 80% when tested per NAPA IS 131 (with a single freeze thaw cycle rather than 5), then in Step 4, the contractor shall employ an antistrip additive, such as hydrated lime (ASTM C977) or a fatty amine, to raise the TSR value above 80%.



# BMP & ESD AS-BUILT CERTIFICATION

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THE STORMWATER MANAGEMENT FACILITIES (BOTH BMP AND ESD) SHOWN ON THE PLANS AHVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS APPROVED BY PRINCE GEORGE'S COUNTY DEPARTMENT OF PERMITTING, INSPECTION AND ENFORCEMENT.

ENGINEERS NAME HERE MD. REG. P.E. NO. XXXXX DATE:

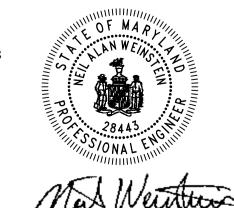
# PROFESSIONAL CERTIFICATION

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE , EXPIRATION DATE:\_

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland

License No.: 28443

Expiration Date: 12/31/18



# Prince George's County Maryland Department of the Environment (DoE) **APPROVED PERMIT SET**

The Department of the Environment (DoE) has completed a review of this document for code compliance. As required by State Code, the design professional(s) responsible for the preparation and content of this document must provide a record copy of these documents with their original seal, signature and date.

Case Name: BOYD PARK STORMWATER RETROFIT

Case Number (Permit #):3287-2018-0 Case Type: DOE SW OTHER

Issuance Date: 1/30/2018 Address: 1801 64TH AVE CHEVERLY, Maryland 20785

Lot(s) and Block(s) and Parcel(s):



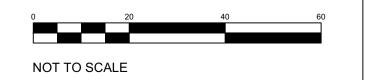
ENVIRONMEN'



LOW IMPACT DEVELOPMENT CENTER

5000 Sunnyside Avenue, Suite 100 Beltsville, MD 20705

Tel. (301) 982-5559 Fax. (301) 982-9305 www.lowimpactdevelopment.org



# MISS UTILITY NOTE

INFORMATION CONCERNING EXISTING UNDERGROUND UTILITIES WAS OBTAINED FROM AVAILABLE RECORDS. THE CONTRACTOR MUST DETERMINE THE EXACT LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND UTILITY CROSSINGS BY DIGGING TEST PITS BY HAND, WELL IN ADVANCE OF THE START OF EXCAVATION. CONTACT "MISS UTILITY" AT 1-800-257-7777. 48 HOURS PRIOR TO THE START OF EXCAVATION. IF CLEARANCES ARE LESS THAN SHOWN ON THIS PLAN OR TWELVE (12) INCHES. WHICHEVER IS LESS. CONTACT THE ENGINEER AND THE UTILITY COMPANY BEFORE PROCEEDING WITH CONSTRUCTION.

CLEARANCES LESS THAN NOTED MAY REQUIRE REVISIONS TO THIS PLAN.

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	REV. NO.	DATE	REVISIONS PRIOR TO APPROVAL

STORM DRAIN DETAILS

FOR PERMIT ONLY

CHEVERLY, MD 20785 PRINCE GEORGE'S COUNTY, MARYLAND

<b>BOYD PARK / 64TH AVENU</b>
STORMWATER RETROFIT
1801 64TH AVENUE

ISSUE:	DATE: 01/23/18
SCALE:	SHEET 8 OF 10
FILE NO:	
DRAFTED: DM	C-1.03B
CHECKED: NW	